

ABSTRACT

Six modular acetabular components were evaluated to determine whether screw holes in the metal shell offer a route for fluid and debris into the acetabular bone stock. A 56 mm acetabular shell for each trial was mounted to a sealed chamber and loaded at a 25° angle under axial loads of 270-2700 newton and ± 2.5 newton-meter torsional load. Polystyrene microspheres (average diameter, 0.5 μm) were placed in double deionized water at 300 mm of water pressure in a sealed chamber above the component. The only channel between the fluid above and the collecting chamber below was through the cup-liner interface and one screw hole. Fluid and debris in the collecting chamber were harvested after 1,000,000 cycles. The collected sample was filtered through a 0.2 micron filter and analyzed under electron microscopy for evidence of microspheres.

Water and polystyrene microspheres were isolated in the collecting chamber for all trials except the Reflection with a screw hole cover and the Micro-Seal cup with a peripheral seal. A screw placed in the screw hole of the Reflection cup failed to seal the interface. The peripheral seal around the rim of the Micro-Seal polyethylene prevented fluid and particle flow between the metal shell and polyethylene liner.